J. Houghton.

Meaſuring made Eaſy.

OR THE
Deſcription and Uſe of
Coggeshall's
SLIDING-RULE

CONTAINING

Inſtructions for meaſuring all Manner of Timber, both by the Common Way, and the true Way: With Directions for taking the Dimenſions of Trees, and the Allowance for Bark, *&c.* performed both by the Rule, and by Arithmetick.

By which may be meaſured all Manner of Superficies, as *Board*, *Glaſs*, *Plaiſtering*, *Painting*, *Wainſcotting*, *Tyleing*, *Paving*, *Land*, both by the Rule and Arithmetick.

By J. GOOD, *Teacher of the Mathematicks.*

Carefully Corrected, and much Enlarged by *J. Atkinſon*, Sen.

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TO THE READER.

I Here preſent you with ſome Fruits of my ſpare Hours, wherein I have endeavoured to render the Uſe of the Sliding-Rule *more plain and Eaſy than ever it appeared before.*

I have here delivered in a few Rules, but yet in a Plain and Eaſy Manner, Problems for the meaſuring all Manner of Regular Figures, *and* Plain Superficies, *ſuch as* Board, Glaſs, Painting, Plaiſtering, Paving, Tyleing, Joyners *and* Maſons *Works,* &c. *and that both by the* Sliding-Rule, *and by* Arithmetick.

In the next place you have Directions for the Meaſuring all manner of Timber or Stone, by the Sliding-Rule, *and* Arithmetically, *by a new Method, whereby the true Content of Round Timber or Trees, may be found.*

I remain a Well-Wiſher to the Mathematicks,

JOHN GOOD

CHAP. I.

The Deſcription and Uſe of Coggeſhall's RULE

THIS *Rule* is fram'd three Ways; *Sliding* by one another, like *Glaſier's-Rules*; *Sliding* on one ſide of a *Two Foot Joint-Rule*; and one part *Sliding* on the other, in a Foot long, the back part being flat, on which are Sundry *Lines* or *Scales*.

Upon the foreſaid *Sliding-ſide* of the *Rule*, are Four Lines of *Numbers*, three are *Double-lines*, and one a ſingle *Line of Numbers*; marked in the *Figure* annexed, with A, B, C, and D.

The three marked A, B, and C, are called *Double-lines of Numbers*; being figur'd 1, 2, 3, 4, 5, 6, 7, 8, 9. Then, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 at the End.

That marked D, is the *Single Line of Numbers*, and figur'd thus, 4, 5, 6, 7, 8, 9, 10, 20, 30, and 40 at the End, even with and under 10 in the *Double-line* next to it, this is called the *Gert-line*, and is ſo marked in the *Figure*.

The Figures on the Three *Double-lines of Numbers* may be encreaſed or decreaſed at pleaſure; thus, 1 at the Beginning may be called 10, 100, or 1000, then 2 is 20, 200, or 2000, ſo that when 1 at the Beginning is 10, then 1 in the middle is 100, and then 10 at the End is 1000; but if 1 at the Beginning is counted for 1, then 1 in the Middle is 10, and then 10 at the End is 100.

And as the Figures are altered, ſo muſt the Stroaks or Diviſions between them be altered in their Value according to the Number of the parts they are divided into: As thus, from 1 to 2 its divided into 10 parts, and each Tenth, is divided into 5 parts, and from 2 to 3 it's divided into 10 parts, and each Tenth into two parts, and ſo on from 3 to 5; then from 5 to 6, it's divided into 10 parts only; and ſo on unto 1 in the Middle of the *Rule*, or the Firſt Part of the *Double Line of Numbers*. The *Second Part*, or *Radius*, is divided like the *Firſt Radius*.

The *Gert Line* marked D, is divided from 4 to 5 into 10 parts, and each Tenth into 2 parts, and ſo on from 5 to 10, then from 10 to 20, it's divided into 10 parts, and each Tenth is divided into 4 parts; and ſo on all the way from 20 to 40 at the End, which is right againſt 10 at the End of the *Double Line of Numbers.*

The Lines on the Back-ſide of this *Rule* that ſlides on one Side, are theſe, a Line of *Inch Meaſure* from 1 to 12, each Inch divided into Halfs, Quarters, and Half-Quarters; another Line of *Inch Meaſure* from 1 to 12, each Inch divided into 10 Equal Parts; and a *Line of Foot Meaſure* being one Foot divided into 100 Equal Parts, and Figur'd 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100 even with 12 on Inch-Meaſure.

And the Back-ſide of the *Sliding Piece* is divided into Inches, Halves, Quarters, and Half Quarters, and figur'd from 12 to 24; ſo that it may be ſlid out to 2 Foot to meaſure the Length of a Tree, or any thing elſe you have occaſion to meaſure.

Note, The *Line of Foot-meaſure* turns Inches, Halves, Quarters, *&c.* into Decimal parts of a Foot, which is moſt ready for Meaſuring by this *Rule*, as alſo by Arithmetick; and it's made fully out in the Table following.

A TABLE *Reducing Inches, Halves, Quarters, and Half-Quarters, into Decimal Parts of a Foot; Or, reducing Inch-Meaſure into Foot-Meaſure.*

Inches	Decimal·	Parts of an Inch						
		1/8	1/4	3/8	1/2	5/8	3/4	7/8
0	.000	.010	.021	.031	.042	·052	,062	.073
1	·083	.094	.104	.115	·125	.135	,146	,156
2	·167	·177	·188	.198	.208	,219	,229	,24
3	.25	.26	.271	.281	·292	·302	,313	·323
4	·333	·344	.35	·365	·375	·385	,396	,406
5	.417	·427	·438	.448	·458	·469	,479	,49
6	.5	·51	.521	.531	·542	·552	,569	573
7	·583	·594	.604	.615	.625	.635	,646	,656
8	.667	.677	,688	.698	·708	·719	;729	.74
9	·75	76	.771	·781	·792	,802	;813	823
10	·833	.844	·854	.865	.875	.885	,89	906
11	.917	.927	·937	·548	·958	·969	,979	,99

C

By this *Table* 1/8 or Half Quarter of an Inch in *Foot Meaſure*, or Decimals, is .01, or 1/100 part of a Foot; 1/4 of an Inch is .021, or ſhorter .02, that is 2/100 parts of a Foot; and ſo on in the upper Line of the *Table*. And in the next Line under it, 1 Inch is

,083 or $\frac{8}{100}$ of a Foot; Inch 1$\frac{1}{8}$ is ,094 or $\frac{9}{100}$; Inch 1$\frac{1}{4}$ is ,104 or $\frac{1}{10}$, Inch 1$\frac{3}{8}$ is 115, or $\frac{11}{10}$ of a Foot, and ſo on: And in the Firſt Column under Decimals 1 Inch .083; 2 Inches .167; 3 Inches is .25; 4 Inches .333; and ſo on to 11 Inches is .917 or $\frac{92}{100}$. All theſe may be found on the *Line of Foot-Meaſure* on the Backſide of the Rule.

CHAP. II.

The Uſe of the Double Scale, *ſhewing how to find the Area of any Plain Superficies*; *and alſo* Arithmetically.

Prob. I. *To meaſure a Geometrical Square.*

BY the *Sliding-Rule*. Let there be a Square whoſe Sides are each three Feet and a half. Set 1 on the Line B, to 3 and $\frac{1}{2}$ on the Line A, then againſt 3$\frac{1}{2}$ on the Line B, is 12$\frac{1}{4}$ Feet on the Line A, which is the Content of ſuch a Square.

1	2	3	*d*
4	5	6	*b*
7	8	9	*f*
c	*d*	*e*	*g*

Arith-

Arithmetically.

F. Par.

The Side of the Square, Feet 3½ or —— 3.5
Multiplied by it ſelf———————————3.5

175
105

The Product is ———————Feet 12.25

This Arithmetical Operation is thus performed, multiply the Side of the Square, namely 3½, or 3 $\frac{5}{10}$ into it ſelf, the Product is 1225, from which cut off 2 places, becauſe there are 2 Decimals in both Fractions, and it will ſtand thus 12 $\frac{25}{100}$; which is 12 Feet and a quarter.

Note, The Figure it ſelf ſhews the Content in Feet by inſpection, for if you tell the greater Squares, you ſee they are 9 in Number; *a* and *b*, makes 10; *c* and *d*, makes 11; *e* and *f*, makes 12; and the little Square *g* in the Corner, makes one quarter of a Foot, which is in all 12 Feet.

More Examples by the Rule.

Length of the ſide 5¼ Feet	27½ Feet
Length of the ſide 7½ Feet	56¼ Feet
Length of the ſide 10¾ Feet	115½ Feet
Length of the ſide 13 Feet	169 Feet

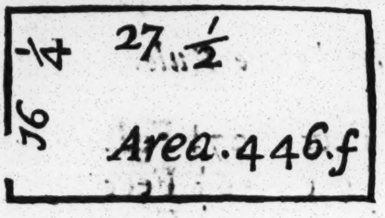
PROB. II. *To meaſure a* Long-Square *by the* Sliding-Rule; *and alſo by* Arithmetick.

LET there be a Long Square, whoſe longeſt ſide is 27 Feet and a half, the ſhorteſt 16 Feet and a quarter: ſet 1 on the Line B, to 16¼ on the Line A, then againſt 27½, on the Line B, is 446¾ Feet, the Content of the Long Square on the Line A.

By Decimal Arithmetick.

Multiply the Length by the Breadth, and from the Product cut off as many Places to the Right-hand as there are Decimals in the Length and Breadth; the Integers remaining to the Left-hand are the ſquare Feet.

Example.	F. Par.
Length 27½ Feet or	27.50
Breadth 16¼ Feet or	16.25
	13750
	5500
	16500
	2750
	446.8750



But Contracted thus. F. Par.

Breadth Feet $16\frac{1}{4}$ or in Decimals ——— 16.25
Length Feet $27\frac{1}{4}$ or 27.25 inverted is——— 5.72

3250
1137
81

The Product is the Content req. Feet 446.8

In this *Contracted Way*, Multiply each Figure of the Inverted Number (beginning at the Right-hand) by the Figure over it, and putting the ſeveral Multiplications even at the Right-hand, as above: Thus, multiplying by 2, the Product is 3250: Then ſay 7 times 5 is 35, leave out 5 and carry 3 in your mind, then ſay 7 times 2 is 14, and 3 I carried makes 17, ſet 7 juſt under the 0, and carry the 1 in your mind; ſaying 7 times 6 is 42, and 1 I carried makes 43, ſet 3 under 5 and carry the 4 in your mind; and ſo on to the End of that Line: Then ſay 5 times 2 is 10, reject the 0, and carry 1 in your mind; then ſay 5 times 6 is 30, and 1 I carried makes 31, ſet 1 juſt under the 7, and carry the 3 in your mind; ſaying 5 times 1 is 5, and 3 I carried makes 8, ſetting it under the 3, and multiplying is done: Then add them together and it's 446.8; that is Feet $446\frac{8}{10}$ or $446\frac{3}{4}$ as before.

Note, Where the Units place of the inverted Number ſtands, ſo many places are to be cut off in the Product: As in this Example, 7 the Units place, when inverted ſtands under 8, the firſt place in Decimals, and therefore one place muſt be cut off in the Product at the Right-hand; ſo that the Product 4468 muſt be 446.8 or $446\frac{8}{10}$; obſerve the like in all that follows.

More Examples by the Sliding-Rule.

		Contents
Breadth $11\frac{1}{2}$ Feet	Length $15\frac{1}{4}$	$174\frac{1}{4}$ Feet
Breadth $17\frac{1}{4}$ Feet	Length $21\frac{1}{2}$	$371\frac{3}{4}$ Feet
Breadth $22\frac{1}{4}$ Feet	Length $29\frac{3}{4}$	$676\frac{3}{4}$ Feet

PROB. III *How to meaſure a Rhumbus by the* Sliding-Rule.

SUppoſe the Side of a *Rhumbus* be 8 Feet 6 Inches and a quarter, and the Breadth, or Line AB, 8 Feet 4 Inches and a half: That is the Length is Feet, $8\frac{52}{100}$ and Breadth is Feet $8\frac{38}{100}$. Then ſet 1 on the Line B, to 8 Feet $\frac{52}{100}$ on the Line A; then againſt 8 Feet $\frac{52}{100}$ on the Line B, is 71 Feet $\frac{40}{100}$ parts of a Foot on the Line A; now if you would find the Value of the Decimal, or part of the Foot, look for $\frac{40}{100}$ on your *Rule*, and you will find againſt it $4\frac{3}{4}$ Inches, ſo that the Content of this *Rhombus* is 71 Feet $4\frac{3}{4}$ Inches.

By

By Decimal Arithmetick.

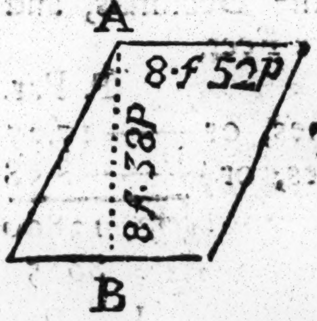
Multiply the Breadth AB, by the Length of any of the Sides, and from the Product cut off as many Places to the Right-hand as are Decimals in the Length and Breadth, the Integers remaining to the Left-hand are the ſquare Feet requir'd.

Example. *F. Par.*

The Length Feet 8.06¼ Inches, or——8,52
Breadth AB, Feet 8.04½ Inches, or——8.38

6816
2556
6816

The *Content* is *Feet* 71.3976
or 71 *Feet* 4¾ *Inches.*



And Contracted is thus,

F. Par.

Length Feet 8·06 Inches 8¼ is in Decim. 8,52
Breadth AB, Feet 8.04 Inches and ½ is 8.38 inverted is———— } 83.8

6816
255
68

The *Content* required as before is *Feet* 71.39

PROB.

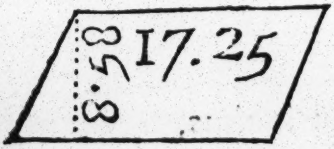
PROB. IV. *How to meaſure a* Rhomboide *by the* SLIDING-RULE.

ADmit the the Length of a *Rhomboide* be 17 Feet 3 Inches, or $17\frac{25}{100}$, and the true Breadth 8 Feet 7 Inches, or $8\frac{58}{100}$, what is the Content? Set 1 on the Line B, to 17.25 on the Line A; then againſt 8·58 on the Line B, is 148 Feet on the Line A.

By Decimal Arithmetick.

Multiply the Length by the Breadth, and from the Product cut off the Decimals, and the Remainder is the Square Feet.

Example.	F. Par.
The Length 17 Feet 3 Inches, or ——	17.25
The Breadth 8 Feet 7 Inches, or ——	8.58
	13800
	8625
	13830
The *Content* is Ft.	1483050



or 148 Feet.

By Contraction thus,	*F Par.*
Length 17 Feet 3 Inches in Decimals —	17.25
Breadth 8 Ft. 7 Inch. or 8.58 inverted is —	85 8
	13800
	862
	138
The Content as before is —— Feet	148·06

PROB. V. *How to meaſure a Triangle by the* Sliding-Rule:

Theorem. EVery Triangle is half of that Long-Square whoſe Length and Breadth is equal to the Perpendicular and Baſe. Therefore from the greateſt Angle let fall a line Perpendicular, to the ſide (oppoſite to the greateſt Angle) called the Baſe: Therefore to find the Content of any Triangle, take half the Length of the Baſe and the whole Perpendicular; or half the Length of the Perpendicular, and the whole Baſe.

Example.

Let the Baſe of a Triangle be 4 Feet, $\frac{15}{100}$ or 4 Feet 1 Inch $\frac{3}{4}$, and the *Perpendicular* 2 Feet $\frac{15}{100}$ or 2 Feet 1 Inch $\frac{3}{4}$, the half of the one is 2 Feet 7 parts, and the half of the other is 1 Foot 7 parts; ſet 1 on the Line B, to 4.15 on the Line A, then againſt 1.07, half the *Perpendicular* on the Line B, is 4 Feet and almoſt half for the Content. Or if you ſet 1 on the Line *B*, to 1.07 on the Line A; againſt 4.15 on the Line B, is 4 and almoſt a half on the Line A. Again, another way, if you ſet 1 on the Line B, to 4.1 on the Line A; then againſt 2.15 on the Line B, is 8 Feet $\frac{9}{10}$ (which is about 11 Inches) on the Line A, the half thereof is 4 Feet 5½ Inches, which is the *Content* of the Triangle.

By Decimal Arithmetick all the three Ways.

F. Par.

1ſt Way { The whole Baſe is ———— 4:15
{ The half Perpendicular is —— 1,07

2905
415

The Content 4 Ft. 5½ Inches, or Ft. 4.4405

2d Way { The whole Perpendicular ——— 2.15
{ The half Baſe ——— 2.07

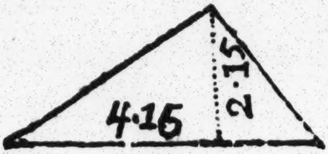
1505
430

TheContent 4 Feet 5½ Inches, or Feet 4.4505

3d Way { The whole Baſe ———— 4.15
{ The whole Perpendicular ——— 2.15

2075
415
830

The Product is Feet 8.9225



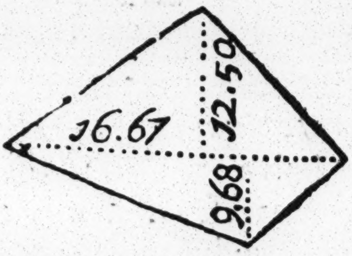
The half is Feet 4.4612
The *Content* is 4 Feet 5 Inches and ½, as before.

By

By Contraction thus,	F.Pa.
The whole *Baſe*	4.15
Whoſe *Perpendicular* 2.15 *Inverted* is	51.2
	830
	41
	21
The Product is	8.92
Half is the Cont. 4 Feet 5½ Inc. as before	4.46

PROB. VI. *Of the Meaſuring a* Trapezium.

A *Trapezium*, is a Figure of 4 Sides, but is not a *Square*, a *Long-ſquare*, a *Rhombus*, nor a *Rhomboides*; which before it can be meaſured muſt be divided into Triangles, by a Line from one Corner to his oppoſite one, through the *Trapezium*; ſo will the two Perpendiculars fall from the other two Angles upon this Diagonal, or Croſs-line; then the *Content* of the Figures are to be found by the laſt *Problem*.



Example, Suppoſe the Dimenſions of a *Trapezium* were as followeth, the Baſe is 16 Feet 8 Inches, the one Perpendicular 12 Feet 6 Inches, and the other 9 Feet 8 Inches, what is the Content?

Decimally.

F. Pat.
One Perpendicular 12 Feet 6 Inches or 12.50
The other 9 Feet 8 Inches, or —— 9.68
The Sum is ——————— 22.18
The half Sum is ——————— 11.09
Multiplied by the whole Baſe—— 16.67

7763
6654
6654
1109

The *Content* 184 Ft. 10½ Inc. or ſeet 184.8703

By *Contraction* thus :

F.Par.
½ Sum of the two Perpen. 11 F. 1 In. or 11.08
Baſe 16 *Feet*. 8 *Inch*. or 16.67 inverted is 76.61

11.08
665
67
8

The *Content* as before is —— Feet 184.8

Note, If 2 ſides of a *Trapezium* are parallel, add them together, and halve the Sum, this half Sum multiplied by the neareſt Diſtance betwixt thoſe two ſides, the Product gives the Content. Or if you meaſure it in the middle betwixt thoſe two Lines, that are parallel, it will be the ſame.

PROB.

PROB. VII. *To meaſure any Regular Figure.*

OF theſe *Regular Figures* there are ſeveral ſorts, as the *Pentagon*, contained under five ſides; the *Hexagon*, contained under ſix ſides; the *Heptagon*, contained under ſeven ſides; and the *Octagon*, contained under eight ſides, *&c.*

Now to meaſure any of theſe ſorts of Figures practically, it is by dividing them into Triangles, which is done by drawing Lines from the *Center* of the Figure to every Angle, then from the *Center* to the middle of any one of the Triangles ſides, draw a Line, which Line is the Perpendicular. Having the Perpendicular and Baſe of any of theſe Triangles (by *Prob.* 5.) find the *Content* of one Triangle, and that multiplied by the Number of Triangles, finds the *Content* of the Figure.

Note, To find the *Center* of any Regular Figure, of even Number of ſides, draw a Line from one Angle to its oppoſite, the middle of which is the *Center*; but if your Figure have any odd Number of ſides, as 5, or 7, *&c.* draw a Line from any Angle to the middle of the ſide oppoſite, the middle of which Line is the *Center*.

CHAP. III. *The Uſe of the* Girt-line, *and Line of* Numbers, *called the* Double-ſcale, *in meaſuring of Circles and their parts.*

Prob. I. LET the Diameter of a Circle be Feet $\frac{25}{100}$, to find the *Content*, ſet 11 on the *Girt-line* D, to 95 on the *Double line* C; then againſt 2 feet $\frac{25}{100}$ on C the *Gert-line*, is 3 feet $\frac{98}{100}$ on the *Double-ſcale* of *Numbers* D, which is the *Content*.

Arithmetically.

The Rule. Multiply the Diameter in Inches by it ſelf, and then by this fixt Number .7854, and from the Product cut off from the Right-hand 4 Figures, the Remainder to the Left-hand is the *Content* of the *Circle* in Inches, which divided by 144, gives the Feet, and the Remainder, if any, divide by 12, gives the *Inches*.

Example.

The Fixt Number—— ——7854
The Diameter multiplied ——729 Inches
70686
The Diameter 27 Inches 15708
The Diameter 27 Inches 54978 F. In.
189 144)572·5566(3.11
54 432
Diam. multipl. 729 Inc. 12)140
12
021
012
09

The *Content* is 3 foot 11 Inches $\frac{3}{4}$

The Rule may be thus, Multiply the Diameter in *Foot-meaſure* by it ſelf, the Product is called the *Square of the Diameter,* then multiply by the fixt Number 0.7854 in the *Contracted way,* and this laſt Product is the *Content* required, as follows.

F. Par.
The Diameter 2 Feet $\frac{25}{100}$ or————2.25
The Diameter 2 Feet $\frac{25}{100}$ inverted is——52.2
450
45
11
The Square of the Diameter is Feet——5.06
The fixt Number 0.7854 inverted is——4587
3542
405
25
2
Content 3 F. 11 Inch. $\frac{3}{4}$ almoſt, or Feet 3.974

PROB. II. *To find the Content of a Semicircle.*

BY having the Diameter by the laſt *Problem,* find the *Content* of the whole *Circle,* the half thereof is the *Content* of the *Semicircle.* I think this needs no Example.

PROB. III. *To find the Content of a Quarter of a Circle commonly called a* Quadrant.

Example. THERE is a Quadrant, whoſe Semidiameter is 7 Feet, and the Circuit of the Arch is 11 Feet, what is the *Content* ? Set 1 on the Double-line B, to 7 the Semidiameter on the Double-line A, then againſt 5 feet $\frac{50}{100}$ (which is half the Circuit of the Arch) on B, is 38$\frac{1}{2}$ on A, the *Content* 38 *Feet* 6 *Inches*, or 38$\frac{5}{10}$.

PROB. IV. *To find the Content of a* Sector *of a Circle*.

The Rule. SET 1 on the Double-line, to the *Semidiameter* on the Double line, then againſt half the *Circuit* of the Arch on the Double-line, is the *Content* on the other Double-line. This needs no *Example*.

PROB. V. *How to meaſure the Segment of a Circle*.

A *Segment of a Circle*, is a ſtrait Line drawn thro' the *Circle*, but not thro' the Center, it divides a Circle into two Parts or Segments; and the leſſer is thus meaſured. Let the *Sector* be meaſured, whereof the Segment is part, then ſubtract the Triangular Part, the Remainder is the *Content* of the Segment: But to the greater Segment, the *Content* of the Triangle included is to be added.

CHAP.

CHAP IV.

The Uſe of the Double Scale; *ſhewing how to meaſure all manner of Superficies, as Board, Glaſs, Painting, Plaiſtering, Wainſcotting, Tyleing, Paving,* &c, *by the Sliding Rule, and Arithmetically.*

1. *In meaſuring Boards.*

PROB. 1. Let there be a *Board* whoſe Breadth is 27 *Inches* $\frac{1}{2}$, or $27\frac{50}{100}$, and the Length 15 foot $\frac{1}{4}$ or $15\frac{25}{100}$, what is the *Content* by the *Sliding Rule*,

Example.

Set 12 on the *Double Scale* B, to $27\frac{1}{2}$ on the *Double Scale A*, then againſt $15\frac{1}{4}$ feet on the *Donble Scale* B, is 35 Feet, the *Content* on the *Double Scale* A.

Decimally.

The Rule. Multiply the Length in Feet by the Breadth in Inches, and cut off ſo many Figures from the Right-hand, as are Decimals in your Length and Breadth, the Remainder divided by 12, the Quotient is the Feet and the Remainder (if any) the odd Inches.

Example. Length is — *Feet* 15.25
Breadth is —— —— *Inches* 27.50

76250
10675
3050 F. In.
12)4193750(34.11
36
059
The *Content* is 34 *Ft* 11 *Inch.*—48
11 *Inches*

The Length 15 Feet $\frac{1}{2}$, or —— Feet 15.25
Breadth 27 *Inch.* $\frac{3}{4}$, or 27.5 inverted is—5.72

3050
1068
76
Product is 419 *Inch.* $\frac{4}{10}$ as before *Inches* 419.4

But if the Breadth be taken in *Foot-meaſure*, it's done without Diviſion as ſollows,

F. Par.
The Length as before, 15 Feet $\frac{1}{4}$, or—15.25
Breadth 27 *Inch.* $\frac{1}{2}$, or 2 Ft. $\frac{29}{100}$ inverted 92.2

3050
305
137
Content is 34*Ft.* 11*Inch.* as before, or*Ft.* 34.92

And by the Sliding Rule it's thus: Set 1 on the *Double Scale* B, to 22.9 on the *Double Scale*

Scale A; then againſt 15.25 on the *Double Scale* B, is almoſt 35 feet on the *Double Scale* A, the *Content* as before.

Or, by the *Rule of Practice*, when the Length is in *Feet* and *Inches*, and the Breadth alſo in the ſame, counting for 1 Foot in Breadth, the whole Length is the *Content*, and for the Inches, according to its Aliquot parts of a Foot or 12 Inches; as it follows, in the laſt *Example*.

A Board whoſe Length being 15 *Feet* 3 *Inches*, and Breadth 27 *Inches* $\frac{1}{2}$ or 2 *Feet* 3 *Inches* $\frac{1}{2}$.

F. Inch.
The Length ——————————— 15.03
Set it down again ——————————— 15.03
Divide by 4, becauſe 3 *Inc.* is $\frac{1}{4}$ of a *Foot* 3.09$\frac{3}{4}$
Div. the laſt by 6, becauſe $\frac{1}{2}$ *In.* is $\frac{1}{6}$ of 3 *In.* 0.07$\frac{3}{4}$
And altogether is the *Content* required 34.11$\frac{1}{2}$

In like manner the *Examples* following may be done, both by the *Foot Meaſure*, and by this *Rule of Practice*, which is worth the Learner's minding.

More Examples

The Breadth 9 Inch.	Length 13 Feet	Con. 9 Feet $\frac{3}{4}$
The Breadth 21 Inch.	Length 19 Feet	Con. 33 Feet $\frac{1}{4}$
The Breadth 25 Inch.	Length 29$\frac{1}{2}$ Feet	Cont. 61 Ft. $\frac{1}{2}$

PROB. II. *Another Way when the Dimenſions are Feet and parts, and the Content is required in Feet and parts, by the* Sliding Rule.

Let there be a Board whoſe Length is 24 Feet $\frac{3}{4}$, and the Breadth 1 Foot $\frac{1}{2}$, what is the *Content* ? *Example.*

Set 1 on the *Double Scale* B, to 1$\frac{1}{2}$ on the *Double Scale* A ; then againſt 24 $\frac{3}{4}$ on the *Double Scale* B, is 37 Feet $\frac{1}{8}$ on the *Double Scale* A, which is the *Content*.

More Examples.

Breadth 3$\frac{1}{4}$ feet	Length 20 feet	65 feet
Breadth 7$\frac{1}{2}$ feet	Length 25 feet	187$\frac{1}{2}$ feet
Breadth 12 feet	Length 30 feet	360 feet
Breadth 15 feet	Length 35 feet	525 feet

How to work this ſecond *Problem Decimally*, as is taught *Chap.* 2. *Prob.* 2.

Example F. Par

Length ———————————— 24.75
Breadth ———————————— 1.50

123750
2475

Content is 37 *Ft.* $\frac{1}{8}$ or 8 *Inch* $\frac{1}{2}$ or *Feet* 37.1250

And by *Contraction* thus, the ſaid *Example.*

F. Par.

Length 24 feet $\frac{3}{4}$, or ———————— 24.75
Breadth 1 *Foot* $\frac{1}{2}$, or 1.5 inverted is——— 5.1

2475
1237

The *Content* 37 *Feet* 1 *Inch* $\frac{1}{2}$, or *Feet* —37.12

Ex-

Examples Decimally Contracted.

Breadth 4.27	Leng. 6.21	$26\frac{51}{100}$ or	26 feet 6 Inc.
Breadth 8.46	Leng. 11.32	$95\frac{77}{100}$ or	95 feet 9 Inc.
Breadth 12.54	Leng. 15.35	$192\frac{48}{100}$ or	192 feet 5 Inc. $\frac{7}{8}$
Breadth 16.74	Leng. 21.42	$358\frac{57}{100}$ or	358 feet 6 Inc. $\frac{7}{8}$

PROB. III. *Directions for the meaſuring of moſt ſorts of Artificers Works, and firſt of Glaziers Work, with the Manner of taking Dimenſions.*

THE beſt way to meaſure *Glaziers Work* is by the *Sliding Rule*, and the Dimenſions are taken very exact, even to $\frac{1}{8}$ of an Inch; they commonly agree for their Work by the Foot, whether the *Glaſs* be Old or New, Squares or Quarries. *Note*, Saſh-Windows are glazied by the Square; that is, they tell how many Squares there be in all the Lights, and then reckon what they come to at ſo much the Score, or Dozen.

PROB. IV.

Let there be a Pane of Glaſs $29\frac{1}{2}$ *Inches long, and 7 Inches broad; what is the Content?*

Example.

By the *Sliding Rule*. Set 144 (repreſented by 1.44) on the Line B, to 7 Inches on the Line A, then againſt $29\frac{1}{2}$ on the Line B, is 1 *Foot* and almoſt a half on the Line A, or *Decimally* 1 *Foot* $\frac{44}{100}$.

More

More Examples:

Breadth 3½ Inch	Length 20¼ Inch	49 parts, or 5 In ⅞
Breadth 5¼ Inch	Length 25½ Inch	92 parts, or 11 In ¼
Breadth 9¾ Inch	Length 30¾ Inch	2 feet 1 Inch ¼
Breadth 13¼ Inch	Length 35 Inch.	3 feet 2 Inches ¾

The foregoing Problem Arithmetically.

Multiply the Length in Inches and Parts, by the Breadth in Inches and parts, and from the Right-hand of the Product cut off ſo many Figures as are Decimals in the Length and Breadth (if there be any) and the Remainder divide by 144, the Quotient is the Feet, and if any thing remain, divide it by 12, the Quotient is *Inches.*

Example.

In. Par.
Length in Inches and Parts——29.5
Breadth in Inches and Parts——7.0
144)206.50(1.5
144
12)062(5 inches
60
The *Content* is 1 *Foot* 5 *Inches*——02
and Remainder 2

To perform this *Decimally*, without *Diviſion*.

Take the Length and Breadth in Foot meaſure, and then it's thus;

Example. *F.Par.*

The Length 29 Inches $\frac{1}{2}$, or ——— 2.46
The Breadth 7 *Inches* or 0.58, inverted is 85
1230
197
The *Content* is 1 *Foot* 5 *Inch.* $\frac{1}{4}$, or *Feet*—1.427

After the ſame manner may all the foregoing Examples be wrought.

PROB. V. *Directions for meaſuring* Joyners *and* Painters *Work; with the manner of taking their Dimenſions.*

J*Oyners* and *Painters Work*, are generally agreed for by the Yard, and therefore having caſt up their Dimenſions, they bring the whole Sum into Yards, by dividing the Feet by 9.

Now in taking the Dimenſions of *Joyners*, or *Painters Work*, ſuch as *Pollection*, and *Bead-work*, you muſt by a line girt Bends and Hollows, and ſo bring it down to the Bottom, after which meaſure the length of the line by your Rule, ſetting it down for one of the Dimenſions, then meaſure the length of the former Height, and ſet it down for a ſecond Dimenſion.

Note, That in *Joyners Meaſure*, *Window-ſhuts*, and *Doors*, are *Work* and *half*, becauſe they are workt on both ſides.

The Paintings of Windows are generally agreed for by ſo much the *Light*, and *Caſements* at ſo much a *Caſement*.

In *Joyners* and *Painters Work*, Deductions are made for all *Windows* and *Chimneys*.

Example.

A *Joyner* hath wainſcotted a Room 44 feet and a half in Compaſs, 9 feet 3 quarters in Height; what is the Content by the *Sliding-Rule*?

Set 1 on the *Double Scale* B, to 44 Feet ½ on the *Double Scale* A, then againſt 9 Feet three quarters on the *Double Scale* B, is 433 Feet $\frac{9}{16}$ on the *Double Scale* A, the *Content*: Or thus, ſet 9 on the line B, to 44½ on the line A, then againſt 9¾ on the line B, is 48 Yards on the line A, which is the Content.

Decimally. F. Par.

The Compaſs of the Room 44.50

The Height ———————— 9.75

22250

31150

40050 yds. feet in.

9)433.8750(48 01 0½

36

The *Content* is 48 *Yards* 073

1 Foot 10 Inches ½ 72

01

And by *Contraction*, the ſaid *Example* is thus,

F.Par.
The Compaſs of the *Room*, 44 feet $\frac{1}{2}$ is—44.5
The Height 9 feet $\frac{3}{4}$ or 9.75, inverted is 57.9
4005
311
22
The Product is Feet 433.8
The Feet multiply'd by 0.111, invert. is 111.0
4338
434
43
The *Content* as before in *Yards* is —— 48.15

How to meaſure Painters Work by the Sliding-Rule.

Example. There is a piece of Painting 13 Feet $\frac{1}{2}$ broad, and 23$\frac{1}{2}$ Feet long. Set 9 on the *Double Scale* B, to 13$\frac{1}{2}$ on the *Double Scale* A, then againſt 23$\frac{1}{2}$ on the *Double Scale* B, is 35 Yards $\frac{1}{4}$ on the *Double Scale* A, which is the *Content* of ſuch a piece of *Painting*.

Decimally.

```
                                     F. Par.
Length 23 Feet ½ or ————————— 23.50
Breadth 13 Feet ½ or - ———————— 13.50
                              ————————
                                117500
                                 7050
                                 2350        yds Ft. inc.
                              ————————
                              9)317.2500(35   2   3
                                 27
                              ————————
                                 047
Content is 35 Yards               45
2 Feet 3 Inches               ————————
                                  02 foot.
```

More Examples.

Breadth 4½ feet	Length 22 ft.	11 Yards
Breadth 15¼ feet	Length 19½ ft.	33 Yards
Breadth 10 feet	Length 30 ft.	33 Yards $\frac{3}{16}$
Breadth 15 feet	Length 29 ft.	61 Yards ¼

PROB. VI. *The meaſuring of Plaiſterers and Painters Work by the* Sliding-Rule.

Example 1. *Of Plaiſtering.*

LET there be a Ceiling plaiſtered, whoſe Length is 25 Feet 3 Inches, and the Breadth 15 feet 6 inches: Set 9 on the *double Scale* B, to 25¼ on the *double Scale* A; then againſt 15½ on the *double Scale* B, is 43 Yards and almoſt a half, on the *double Scale* A, which is the Content. *Example*

Examples 2. Of Paving.

Let there be piece of a Paving 34½ Feet long, and 12½ Feet broad; ſet 9 on B, or 34½ on A, then againſt 12½ on B, is 48 Yards almoſt the Content.

PROB. VII.

THE meaſuring ſuch Superficies as are meaſured by the Square of 10 feet (*viz.* 100 Feet in a Square, for if you multiply 10 by 10 it makes 100) ſuch as *Flooring*, *Roofing*, *Partitioning*, *Tyling*, &c.

By the Sliding Rule.

The *Rule*. Set 100, or 1 in the middle, to the Length; againſt the Breadth is the *Content*.

Example.

There is a Floor whoſe Length is 61 Feet and a half, the Breadth 14 feet and a quarter, ſet 100 on B, to 61½ on A; then againſt 14¼ on the *Double-Scale* B, is 8 Square ¾ on the *Double-Scale* A, for the Content, being 8 Square 75 Feet.

Decimally.

Multiply the Length by the Breadth, and from the Product cut off two more Decimals than is in the Length and Breadth, the Figures remaining are the Squares.

Example. F. Par.

Length 61½ feet or in Foot-meaſure——61.50
Breadth 14¼ feet or in Foot-meaſure——14.25
30750
12300
24600
6150
Content 8¾ Squares, or 76 Feet ——8.763750

By *Contraction* the ſame *Example* is thus,
Breadth 14¼ feet is in Foot-meaſure feet 14.25
Length 61½ feet, or 61.5. inverted is ——5.16
8550
142
71
Product (cutting off 3 places is) Squares 8.763

More Examples.		*Contents.*
Length 42 feet	Breadth 24½ feet	10 ſquares 29 feet
Length 64 feet	Breadth 29 feet	18 ſquares 55 feet
Length 86 feet	Breadth 35½ feet	30 ſquares 53 feet

Deductions in this Problem.

In *Carpenters-Work*, you are to deduct for all *Well-holes* in your *Flooring*, for all *Chimney-hearths*, and the like.

Alſo in *Partitioning*, Deductions muſt be made for all *Doors* and *Windows* that are meaſured in.

In *Roofing* make no Deductions for *Window-ſhafts*, 'or *Sky Lights* becauſe they are more Trouble to the Workman than the Stuff is worth that would cover them.

PROB. V.

Having in the former Part of this Treatiſe ſhewed the Meaſuring all manner of Superficies, likewiſe all ſorts of Regular Figures: I ſhall now give you ſome Inſtructions for the taking the Dimenſions of Trees, or Round Timber, and ſo proceed to the Meaſuring of ſuch, and all manner of Solids.

THE Tree being cut down, the Cuſtom is to Gert it, as is ſhewed in the beginning of the next *Chapter*, and for the Length they account from the But-End, up ſo far as the Tree will hold half a Foot Gert when twice folded.

The Dimenſions being taken, the Tree is to be meaſured by *Chapter* the ſixth, as ſquare Timber.

If the Tree have great Boughs that will hold half a Foot Gert, ſuch Boughs are called *Timber*, and they are meaſured and are added to the whole.

1. *Note*, If round, rough *Timber* be meaſured for Sale; the common Way among Artificers in allowing for Rind or Bark is thus: if the Gert or fourth part of the Circumference of the Tree be $\frac{50}{100}$ or half a Foot, they allow $\frac{05}{100}$ or half Inch half quarter. If the fourth part of the Circumference

be a Foot, they allow $\frac{1}{10}$: or one Inch and almoſt a quarter; if one Foot $\frac{1}{2}$ Gert $\frac{15}{100}$, or an Inch and above three quarters for the Bark, *&c.* But for *Beach*, *Elm*, *Aſh*, and ſuch that is thin Bark'd, then the Allowance muſt be a ſmall matter leſs.

2. I have ſeen great Difference in the Gert of a Tree in the Space of two Feet, or leſs, and that hath been generally where one or two Arms have been cut off: In ſuch a Caſe it is neceſſary to Gert the Tree twice or thrice, if there be any great Difference, or otherwiſe there will be Loſs to the *Buyer* or *Seller*. Again, they ſay the *Buyer* hath Priviledge to Gert any where between the Middle and the Ground End, if it be for his Advantage.

Laſtly, The *Content* of any piece of *Timber* being found in Feet, if divided by 50, you have the *Content* in Loads: But ſome will have a Load to be 40 Solid Feet, therefore you may take which of the two is moſt cuſtomary with you. The Reaſon why the Difference is, they ſay, becauſe it is ſuppoſed that 40 Feet of round Timber, or 50 Feet of hewn Timber, weigh about a Tunn, or twenty Hundred Weight, which is commonly accounted a *Cart-load*.

CHAP. VI. *The Meaſuring of* Round Timber *the common Way.*

TAKE the Length in Feet, Half-feet (and if deſired) in Quarters, then meaſure half way back again, where Gert the Tree with a ſmall Chord or Chalk-line: Double this Line twice very even. This fourth part of the Gert or Circumference (I call the Gert) meaſure in Inches, Halves, and Quarters of Inches; but be ſure the Length be given in Feet, *&c.* and the ſide of the Square or Gert in Inches.

So you have always three Numbers given, to find the fourth, *viz.* 12 on the Gert Line for the firſt, the Length in Feet always for the ſecond, and the Gert or Side of the Square for the third, in Inches, Halves and Quarters.

Now we come to the *Rule*. Set 12 on the Gert-line *D*, to the Length (in feet, *&c.*) on the Double-Scale *C*, then againſt the ſide of the Square on the Gert-line *D*, in Inches, Halves and Quarters) you will find, on the Double-Scale *C*, the Content.

Note, This Rule is General.

Example 1. Suppoſe the Gert of a Tree in the middle be 64 Inches, and the Length 31 Feet, what is the Content? Set 12 on the Gert-line *D*, to 31 Feet on the Double-ſcale *C*;

then againſt 16, the one fourth of 64, on the Gert-line *D*, is 55 Feet, the Content on the Double-Scale *C*.

2. A piece of Timber is 15 Feet long, and one fourth of the Gert 42 Inches: Set 12 on the Gert-Line *D*, to 15 on the ſecond Length of the Double Scale *C*; then againſt 42 at the beginning of the Gert Line *D*, is on the Double Scale *C* 184 Feet the Content, reckoning the firſt 1 at the Beginning of the Line of *Numbers* (or Double-ſcale) to be 100, the 8 Grand Diviſions 80, the two ſmall ones 4; ſo accounting all together makes (as I ſaid before) 184 Feet.

3. A Length is 9 Feet three quarters, and one fourth of the Gert 39 Inches, ſet 12 on the Gert-line *D* to 9¾ on the Line of Numbers C, and againſt 39 at the Beginning of the Gert-line *D*, is 103 Feet the Content on the Double-ſcale of Numbers *C*.

4. The Length 9 Inches; the Quarter of the Gert is 35 Inches. Now becauſe the Length being not one Foot, meaſure it by your Line of Foot-meaſure; and ſee what part of a Foot it makes, a foot ſuppoſed to be divided into a hundred Parts: Or do thus, ſet 12 on the Double-Scale *B*, to 100 on the Double-ſcale *A*, then againſt the Length in Inches, namely, 9 on the Double line *B*, is 75 on the Double ſcale *A*, for the Decimal or part

of a Foot : Then ſet 12 on the Gert-line *D*, to 75 in the firſt Length of the *Double-ſcale* C, then againſt 35 on the Gert-line D, is 6 feet $\frac{4}{10}$, or almoſt half a Foot on the *Double-ſcale* C, for the *Content*.

5. A *Rail* is 16 feet long, the Quarter of the Gert 3 Inches ; ſet 12 on the Gert-line D, to 16 on the firſt Length of the *Double-ſcale* C, then againſt 30 (now called 3,) on the Gert-line D, is juſt 1 Foot the Content, on the Double-line C.

More Examples.

One fourth of the Gert or ſide of the Square in theſe Examples is	The Length in feet	The Content in Feet and Parts are
11 Inches	$40\frac{1}{2}$	34 feet
16 Inches	$39\frac{1}{2}$	70 feet $\frac{3}{10}$
14 Inch. $\frac{1}{4}$	50	68 feet
21 Inches	48	147 feet $\frac{9}{10}$
8 Inch. $\frac{3}{4}$	$36\frac{1}{2}$	19 feet $\frac{4}{10}$
31 Inches	24	160 feet

In taking all the Dimenſions in *Foot-meaſure*, it's performed by the *Sliding-Rule* ſooner than by *Inches*, thus count 10, 20, 30, 40, *&c.* on the *Gert-line* to be 1, 2, 3, 4, *&c.* in *Foot-meaſure*, and then place 10 on the *Gert'line* D, to the Length of the Tree, on the *Double-line* C ; and againſt the Gert in *Foot-meaſure* on the *Gert-line* D, ſtandeth the *Content* on the *Double-line* C.

1. *Example* before mentioned. A Tree in Length 31 *Feet*, and Gert 64 Inches, or *Feet* $5\frac{32}{100}$ it's fourth is *Foot* $1\frac{30}{100}$, what's the *Content*?

Set 10 on the *Gert-line* D, to 31 Feet on the *Double-line* C; then againſt 1 *Foot* 33 *parts*, on the *Gert line* C, is 55 *feet* on the *Double-line* C, which is the *Content* as before.

2. A Piece of Timber 15 feet long, and one fourth of the Gert 42 Inches, or feet $3\frac{5}{10}$, what's the *Content*.

Set 10 on the *Gert-line* D, to 15 on the firſt part of the *Double-line* C; then againſt 3 Feet 5 Tenths, on the *Gert line* D, is 184 Feet on the *Double-line* C, the *Content* requir'd. Again,

3. A Length is $5\frac{3}{4}$ Feet or 9 feet $\frac{75}{100}$, and one fourth of the Gert 39 Inches, or 3 Feet $\frac{35}{100}$: Set 10 on the *Gert-line*, to 9 $\frac{75}{100}$ on the *Double-line* C; and againſt 3 $\frac{25}{100}$ on the *Gert-line* D, is beyond 100 on the *Double-line* C: In ſuch Caſes take half the Length, and then the Content muſt be doubled. As here,

Set 10 on the *Gert-line*, (to the half of $9\frac{75}{100}$) $4\frac{87}{100}$, and then againſt $3\frac{25}{100}$ is $51\frac{5}{10}$, the double is 103 Feet, the Content requir'd.

4. The Length 9 Inches or $\frac{75}{100}$ of a Foot, the Quarter of the Gert 35 Inches or 2 Feet $\frac{92}{100}$ ſet 10 on the *Gert-line*, to $\frac{75}{100}$ in the *Double-line* C, and againſt 2 Feet $\frac{92}{100}$ in the *Gert-line*, is 6 Feet $\frac{4}{10}$ on the *Double-line* C, the Content required. Again,

5. A *Rail* 16 Feet long, the Quarter of the Gert 3 Inches, or $\frac{25}{100}$ of a Foot, what's the Content?

Set 10 on the Gert-line, to 16 in the Double-line, then againſt $\frac{25}{100}$ in the Gert-line, is 1 Foot, the Content on the Double-Line C.

And in like manner may all the *Examples* aforegoing, be wrought by the *Sliding Rule*, if you take the fourth of the Gert in *Foot-meaſure*; for 11 Inches count $\frac{92}{100}$, for 16 Inches count $1\frac{33}{100}$, for 14 Inches count $1\frac{17}{100}$, for 21 Inches count $1\frac{75}{100}$, for $8\frac{3}{4}$ Inches count $\frac{73}{100}$, and for 31 Inches count $2\frac{58}{100}$, and ſo for the Length $40\frac{1}{2}$ feet is $40\frac{5}{10}$, and ſo on for any other, which may be ſeen by the Table of *Foot-meaſure*, or by the Line of *Foot-meaſure* on the *Sliding Rule*.

If it be required to find the Content of any piece of Timber in Loads, at 40 Feet the Load, uſe half the Gert inſtead of the whole.

Example.

A Length is 15 Feet, and a Quarter of the Gert is 42 Inches; ſet 12 on the Gert-line *D*, to 15 on the firſt Length of the *Double-ſcale* C then againſt 21, (which is half of 42 one Quarter of the Gert) on the Gert-line D, is 46 on the *Double-ſcale* C, whereof 4 is 4 Loads, and the 6 multiplied by 4, makes 23

Feet, which is 4 Load 24 Feet, or 4 Loads $\frac{6}{10}$.

If at any time you have the Content in Loads, and you would have it in Feet; 'tis but multiplying the Content found in Loads by 4, the Square of 2, by which you divided your Gert. So 46 multiplied by 4, is 184 Feet.

If you take the Dimenſions in *Foot-meaſure*, you may find the Loads contained in any Timber, thus. If a Length be 15 Feet, and quarter of the Gert 42 Inches, that is 3 Feet $\frac{5}{10}$ whoſe half is 1 Foot $\frac{75}{100}$, Then ſet 10 on the Gert-line D, to the Length 15 on the Double-line C, then againſt $1\frac{75}{100}$ (the half of $3\frac{5}{10}$ one quarter of the Gert) on the Gert-line is $4\frac{6}{10}$ on the Double Line C, which is 4 Loads $\frac{6}{10}$, or 4 Loads 24 Feet, the Content required.

If at any time you would know the Content of any piece of Timber by Natural Arithmetick; having Gert your Tree, and taken one fourth part for the ſide of the Square, obſerve the following *Rule*.

Multiply the Length of the ſide of the Square in Inches into it ſelf, and the Product divide by 144, the Quotient is the Content in Feet, and if any thing remain, divide again by 12, the Quotient is the odd Inches.

So

So in Example the Second.

A piece of is *Timber* 15 *Feet* long, the quarter of the Gert is 42 Inches, what is the Content of the Tree ?

```
The ſide of the Square ———————42 Inches
Multiplied by it ſelf————————42
                              ————
                              84
                             168
                            ————
The Product is Inches————————1764
Multiplied by the Length——————15 feet
                            ————
                            8820
                           1764 (feet inc.
                        144)26460(183.9
                            144
                            ————
                            1206
                            1152
                            ————
                            00540
                              432
                          12)108(9 Inch.
                             108
                             ————
Content is 183 Feet 9 Inches——000
```

But by *Decimal Arithmetick*, taking all the Dimenſions in *Foot-Meaſure*, it's much ſhorter, as follows by the foreſaid *Example*.

Side

F. Par.
Side of the Square 42 Inch. in *Foot-meaſure* 3.5
Multiply it by it's Self ——————— 3.5

175
105

The Product is ——————— Feet 12,25
Multiply it by it's Length ——— Feet — 15

6125
1225

Laſt Product is the *Content* in *Feet* ——— 183.75
That is 183 *Feet* $\frac{75}{100}$ or *9 Inches* as before.

CHAP. VII.

Of the Menſuring of Round Timber *or* Trees, *the true Way by the* Sliding Rule *and* Arithmetically.

THE laſt Way being the common Way of meaſuring *Round Timber*, but it giveth not the true Content, but is always too little, (though it be generally uſed :) I ſhall now give you a point on the *Rule*, which muſt be uſed inſtead of 12 ; which point you may cut with a ſharp pointed Penkniſe at 10.635, but much better by the *Inſtrument-Maker*.

So in the ſecond Example foregoing.

Let the Length be 15 feet, the one fourth of the Gert is 42 Inches : Set the ſaid point (which is 10.635 the true point) to 15 the

Length, then againſt 42, at the Beginning of the *Gert-line*, is 233 feet on the Double-ſcale for the Content; whereas the common way giveth but 184 Feet.

Note, That the common Meaſure is to the true Meaſure, as 11 is to 14; ſo that if you ſet 11 on the *Double-ſcale* to the Content found the common Way, 14 ſhall point out the true Content of the ſame; and if you ſet 14 to any true Content, 11 ſhall point out the Content the common Way; this is done on the *Double-line*.

The Gert being taken in *Foot-meaſure*, the point for true Meaſuring is 8862 or $\frac{8862}{10000}$ or more briefly $\frac{89}{100}$, and then for the foregoing *Example*.

The Length being 15 Feet, the one fourth of the Gert 42 Inches; that is, 3 Feet $\frac{5}{10}$ or Feet 3.5 Tenths, I demand the true *Content*.

Set the aforeſaid Point $\frac{89}{100}$, on the *Gert-line* D, to the Length 15 Feet on the *Double-line* C, (in it's firſt Part or Beginning); then againſt Feet 3.5 Tenth (which is 35) on the *Gert-line* D, is 233 Feet on the *Double-line* C, which is the true Content required. Again,

Suppoſe a round Tree in Length 31 Feet, and one Quarter of it's Gert 16 Inches, that is 1 Foot $\frac{33}{100}$, or Foot 1.33 Parts; what's the true Content?

Set 89 on the *Gert-line* D, to 31 Feet on the *Double-line* C, then 1.33 on the *Gert-line* D, points to 70 Feet on the *Double-line* C, the true Content required; whereas by the firſt *Example* of *Chapter* the *6th*, the Content of this Tree is but 55 Feet, by the common way of Meaſuring, which is no leſs than 16 Feet ſhort of Truth.

I ſhall next ſhew how to find the true *Content* of *Timber*, *Arithmetically*, as followeth.

By a *Fixed Number* or *Decimal*, .2821, which multiply by the Gert of the Tree taken in Inches, and from the Product cut off four Figures to the Right-hand, the remaining to the Left-hand, are the Inches for the ſide of the Square equal to the Gert or Circumference of the Tree.

And for underſtanding it, take theſe two or three Examples, how to find the ſide of the Square that ſhall be equal to the Gert or Circumference of the Tree, by this *Fixt Number* 2821, always to be uſed; when the Gert is Inches.

This *Decimal*, or *Fixt Number* is .2821
The Gert in the 2d *Example* is —— 168 Inches

22568
16926
2821

The Product is ———— Inches 47.3928

Here the ſide of a Square equal to that *Gert* is .47 Inches and a quarter; for theſe four Decimals cut off, are ſo many parts of 10000, and .3928 is almoſt $\frac{4}{10}$ of a Foot, which is more than a quarter of an Inch.

Another Example.

The fixt Number is————————.2821
The Gert is ——— ——— ————48 Inches
22568
The ſide of a Square equal ——11284
To this *Gert* is 13½ Inc. or Inc. 13.5408

Another Example.

The Fixt Number is———————— .2821
The Gert is ————————————54 Inches
11284
The ſide of a Square equal———14105
to this *Gert* is 15¼ Inc. or Inch. 15.2334

I now proceed to work the foregoing piece of Timber or Tree.

Arithmetically.

Multiply the Inches of the Square (with the firſt Left hand Figure of the four which is cut off) into ſelf, and that Product by the Length in Feet, and divided the laſt Product by 144, the Quotient is Feet, and the Remainder, if any, divide by 12, the Quotient is Inches.

Example. F.Par.

The ſide of the Square in Inches 47.3

Multiply by it ſelf——————— 47.3

1419
3311
1892

In the Product cut off 2 Decim. 2237.29Pt.

The Length in Feet——— ——— 15

11185
2237 (F. I.
144)33555(233.3
288
0475
432
0435
432

The Content of this *Timber*
is 233 Feet 3 Inches——} ——— 003 Inch.

Another Example for Practice.

There is a *round Tree* whoſe *Gert* is 48 *Inches* and the *Length* 8 Feeet 9 Inches, what is the Content?

Multiply the Inches of the ſide of the *Square* equal to the Gert (with the firſt Figure on the Left-hand of the four cut off) into it ſelf, and from the Product cut off two Figures to the Right-hand, the Remainder multiply by the Inches of the Length of the Tree (and not by the Length in Feet) becauſe the Length is Feet and Inches, therefore you muſt bring your Length into Inches by multiplying them by 12, this laſt Product divide by the Inches that are in a ſquare Foot of Timber, namely 1728, the Quotient is the Feet, the Remainder (if any) divide by 144, the Quotient is the odd Inches.

Example.

The Side of the Square being Inches—13.5
Multiply it by it ſelf————13.5
F In. 675
The Length —— 8.9 405
Multiplied by——12 135
Makes —— ——105 Inches —— 182.25
The Length in Inches is ————105 Inch.
910
1820
1728)19110(11F
1728
01830
1728
0102

The Content of this round Tree is 11 Feet, and 102 remains, which is not one Inch.

Note. The fix'd Number 2821 is the ſide of a Square, that's equal to a Circle whoſe Gert is 1 Inch, or 1 Foot, or 1 any Thing.

Alſo the Number 10.635 is the ſide of a Square that's equal to a Circle whoſe Diameter is 12 *Inches.*

Alſo .8862 (more ſhorter .89) is the ſide of a Square that's equal to a Circle whoſe Diameter is 1 Foot, or 1 any Thing.

Now to perform this Arithmetically, when all the Dimenſions are taken in Foot-meaſure.

The *Rule.* Multiply the whole Gert by the Fixt'd Number .2821, and the Product is the Side of a Square equal to that Gert; then multiply that Product by it Self, and this laſt Product multiply by the Length of the Tree, and it produceth the Content required.

Example. Let the Length be 15 feet, and the Gert 14 feet. I demand the true Content?

The fix'd Number is ———— .2821
Multiply by the Gert 14 feet, inverted is—41
2821
1128
The Product is the ſide of the Square Ft. 3.949
Multiply by it ſelf inverted is ———949.3
11847
3546
156
27
The Product is the Square——Feet 15.576
Mnltiply by the Length 15 Feet, inverted—51
15576
7785
The Product is the Content——Feet 233.51
That is 233 Feet $\frac{51}{100}$ or 233 Feet 6 Inches.

Another Example for Practice.

A round Tree, whoſe Gert is 48 Inches, or 4 Feet, and Length 8 Ft. 9 Inc. or 8Ft. $\frac{75}{100}$.

The fixd'd Numbe is ——————————— .282
Multiply by the Gert 4 Feet ——————— 4
Product is the ſide of the Square —— foot 1.128
Multiply by it Self, inverted is - ———— 8.211
1128
112
22
8
The Product is the Square —— Foot 1.270
Multiply by the Length 8.75, inverted is 57.8
10160
889
60
The Product is the Content —— Feet 11.109

CHAP. VIII.

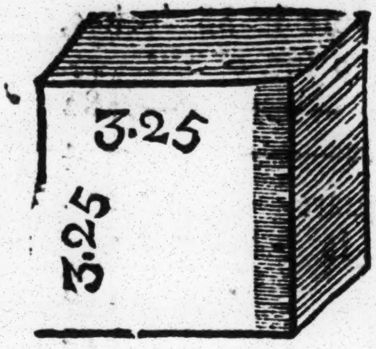
To meaſure the CUBE.

LET there be a Cube whoſe ſides are 3 Feet 3 Inches, what is the Content?

By the Sliding-Rule

Set 12 on the Gert-line D, to 3¼ on the Double ſcale C; then againſt 39 Inches the ſide of the Cube on the Gert-line D, is 34 feet and ¼ on the Double-ſcale C, the Content required.

Decimally.



F·Par.
The ſide 3 ft. 3 in·or 3.25
Multip. by the ſame 3·25
1625
650
975
The 1*ſt Prod.* is 10.5625
Multip. by the ſame 3.25
528125
211250
316875
The Content is $34\frac{1}{3}$ feet or—feet 34.328125

But by Contraction thus,

F. Par.
The ſide of the Cube 3 feet 3 inches or—3.25
Multiply by 3 feet 25 parts, inverted is—52.3
975
65
16
The firſt Product called the Square, is ft. 1056
Multiply by 3 feet 25 parts, inverted is—52·3
3168
211
53
The Content $34\frac{1}{3}$ feet as before,—feet 34·32
CHAP.

CHAP. IX.

To meaſure Timber that is neither round, nor Square; but firſt to find a Mean Proportional between any two Numbers.

TO find this *Mean Proportional*, ſet the greater of the two Numbers on the *Gert-line*, to the ſame on the *Double-line* of Numbers; then again, the leſſer on the *Double-line* of Numbers, is the Mean Proportional on the *Gert-line*; or ſet the leſſer on the *Gert-line*, to the ſame on the *Double-line* of Numbers; then againſt the greater on the *Double-line* of Numbers, is the Mean *Proportional* on the *Gert-line*; any one of theſe will do.

Note, Examples of this are in the next *Problem.*

PROB I.

To meaſure unequal ſquared Timber, that is, the Breadth and Depth are not Equal.

Meaſure the Length of the Piece in Feet and the Breadth and Depth, (at the End) in Inches. Then find the Mean Proportional between the Breadth and Depth of the Piece as is taught (in *Chap.* 9. and) in the Example following. The Mean Proportional is the ſide of a Square equal to the End of the Piece; which having found the Piece may be meaſured as Square Timber.

Example I.

In a piece of Timber whoſe Length is 13 Feet, the Breadth 23 Inches, and the Depth 13 Inches; Set 23 on the Gert-line D, to 23 on the Double-ſcale C; then againſt 13 on the Line C, is 17.35, or $17\frac{1}{3}$ on the Gert-line D, then ſetting 12 on the Gert line D, to 13 Feet the Length on the Line of Numbers C, then againſt $17\frac{1}{3}$ (the *Mean Proportion*) on the Gert-line D, is 27 Feet the Content required.

Example II.

In Stone, which let it be 7 Feet 40 parts, or 7 Feet and about 5 Inches in Length, and 30 Inches in Breadth, and $23\frac{1}{2}$ deep; ſet 30 Inches on the Gert-line D, to 30 on the *Double-ſcale* C; then againſt $23\frac{1}{2}$, on the *Line of Numbers* C, is $26\frac{1}{2}$, or 26,50, on the *Gert-line* D: Then ſet 12 on the *Gert-line* D, to 7.40, on the Line C, then againſt $26\frac{1}{2}$ on the *Gert-line* D, is 36 Feet the Content on the *Double-ſcale* C.

The Content of theſe two Examples by Arithmetick, is thus,

The firſt Example.

Let there be a Piece of Timber whoſe *Length* is 13 *Feet*, the Breadth 23 *Inches*, and the Depth 13 *Inches*.

The

The Rule.

Multiply the Breadth in Inches, by the *Depth* in Inches; and that Product multiply by the *Length* in *Feet*, and divide the laſt Product by 144, the Quotent is *Feet*, and the Remainder (if any) divide by 12, the Quotient is *Inches*.

Example.

```
The Breadth  23 Inches.
The Depth    13 Inches.
             ——
             69
             23
             ———
The Product 299
Multiply by  13 Ft.
            ———
            897
           299
           ————
       144)3887(26 Ft.
           288
           ————
           1007
            864
           ————
        12)143(11 Inches.
           12
           ———
           023
            12
           ———
            11 Remainder is 11/12 of an Inch.
```

Note, This Example by the *Sliding-Rule* was 27 *Feet*, by Arithmetick it wants 1 *Inch*; for it is 26 *Feet* 11 *Inches*.

By Foot-meaſure it's done thus.

F. Par.
Breadth 23 Inches in *Foot-meaſure* is 1.92
Depth 13 Inches or Feet 1.08 inverted is 80.1
1.92
15
The Product is ——— ——— *Feet* 2.07
Multiply by the Length 13 Feet inverted is 31
207
62
Content is 26 Feet 11 Inches, or Feet —26.9

The Second Example, Decimally.

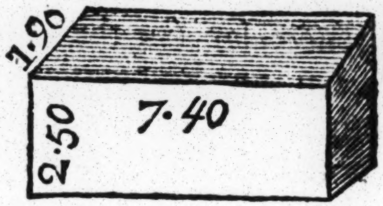
Let there be a piece of Stone 7 Feet 40 parts long, 2 Feet 50 parts in Breadth, and 1 Foot 96 parts in Depth, what is the Content?

The Rule.

Multiply the Length by the Breadth, and the Product by the Depth or Thickneſs; and cut off from the laſt Product, as many places to the Left hand as there be Decimals in the three Dimenſions, the Integers remaining are Feet.

Example.

F.Par.
The Length ———————— 7.40
The Breadth ———————— 2.50
37000
1480



The *Prod. Feet*. 18.5000
The *Depth Ft*. 1.96
1110000
1665
185

The Content is 36 Ft. 3 Inc. or Ft. 36.260000

By Foot-measure its thus Contracted.

F. Par.
The Stones Length 7 Feet 5 Inches that is 7.41
Stones Breadth 30 Inches or 2.5, inverted is 5.2
1482
370
The Product is———————Feet 18.52
Depth 23½ Inches, or 1.96, inverted is 69.1
1852
1667
111

The Content is 36 Feet 4 Inches or Feet 36.30

PROB.

PROB. II.

To find the Content of a piece of Timber whoſe End is in the Form of a Triangle; and both Ends alike Equal.

TO find the *Content* of ſuch *Timber*, firſt find a mean Proporrion between the Baſe and half the Perpendicular (of the Triangular End) or between the Perpendicular and half the Baſe, both meaſured in Inches. Then is the Mean Proportional the ſide of a Square equal to the Triangle.

Then to find the Content, ſet 12 on the Gert-line D, to the Length in Feet on the *Line of Numbers* C, then againſt the Mean Proportion on the Gert-line D, is the Content on the *Line of Numbers* C.

But the Dimenſions being all taken in *Foot-meaſure*, and the mean Proportional found in the ſame; then ſet 1 on the Gert-line D, to the Length in the Double-line C; then againſt the Mean Proportional in the *Gert-line* D, is the Content in the Double-line C.

Note, If the two ſides of a Triangle be equal, the other ſide is called the Baſe, but if the three ſides be unequal the longeſt ſide is the Baſe: From whence the neareſt Diſtance, to the oppoſite Angle, is the Perpendicular.

Example. A piece of *Timber* 19 Feet 6 Inches in Length, the Baſe of the Triangle at each End being 21 Inches, and the *Perpendicular* to each *Baſe* being 16 Inches, what's the *Content.*

Set 21 Inches on the *Gett-line* D, to 21 on the Double-line C; then againſt 8 on the Line C, is $12\frac{7}{8}$, or 12.95 on the Gert-line D, the Mean Proportional.

Then ſet 12 on the Gert-line D, to $19\frac{1}{2}$ Feet the Length on the Double-line C; and againſt 12.95 (the Mean Proportional) on the *Gert-line* D, is $22\frac{3}{4}$ or (Feet $22\frac{8}{10}$ the *Content* required) on the Double-line C. Or thus, take all the Dimenſions in *Foot-meaſure*, and then the Length 19 Feet 6 Inches is 19.5, the Baſe 21 Inches is 1.75, and the Perpendicular 16 Inches is 1.33; Now ſet 1.75 on the Gert-line D, to 1.75 on the Double-line C, and againſt 0.67 on the Double-line C, is 1.08 (on the Gert-line D) for the Mean Proportional: Then ſet 1 on the Gert-line D, to the Length 19.5 on the Double-line C, and againſt 1.08 on the Gert-line D, is 22.8 (or Feet 22 almoſt 11 Inches) on the Double-line C, for the Content, very near to that before.

Arithmetically.

The Rule; multiply the Baſe by the Perpendicular (both taken in Foot-meaſure) and half that Product multiply'd by the

Length, produceth the Content required, as in the foreſaid *Example*.

F. Par.
The Baſe 21 Inch. or in Foot-meaſure is 1.75
The Perpendicular 16 Inch. or 1·33 inver. 33·1
175
53
5
The Product is ——————— Feet 2.33
Half the Product is ——————— Feet 1.17
The Length 19 Ft. 6 Inch. 19.5, invert. is 5·91
117
105
6
The *Content* is 22 Feet 10 Inches, or Ft. 22.8

PROB. III. *To meaſure Timber that Tapareth.*

THE Length meaſured in Feet, and note one third of the Length, which may be found by the *Sliding Rule*, thus; Set 3 on the *Double-Line* A, to the Length on the *Double-Line* B; then againſt 1 on the *Double-Line* A, is the third part on the *Double-Line* B; then if the Solid be round, Meaſure the Diameter at each End in Inches, ſubtracting the leſſer Diameter from the greater, and add half the Difference to the leſſer Diameter, the Sum is the Diameter in the middle of the

Piece; then ſet 13·54 on the Gert-line *D*, to the Length on the *Double Line* C, then againſt the Diameter in the middle on the *Gert-Line D*, is a fourth Number on the *Double Line* C, then ſet 13·54 or 13½ of the Gert-line *D*, to the third part of the Length on the *Double-Line* C; then againſt the half Difference on the Gert-line *D*, is another fourth Number, on the *Double-Line* C, theſe two fourth Numbers added together makes the Content.

Example. Let the Length be 27 Feet (the one third by the Rule is 9) the greater Diameter 22 Inches, and the leſſer 18 Inches.

See the Operation.

The greater Diameter ——— 22 Inches
The leſſer Diameter ——— 18 Inches
The Sum is ——— 40
The Difference ——— 04
The half Difference ——— 02 } added
The leſſer Diameter ——— 18 }
The Diameter in the middle ——— 20 Inches.

Then ſet 13·54, or 13½ on the Gert-line D, to 27 on the *Double-Line* C; then againſt 20 on the Gert-line D, is 58·900, that is 58 Feet $\frac{900}{1000}$ parts.

Again, ſet 13·54 of the Gert-line D, to 9 on the Double-line C; then againſt 2 on the Gert-line (repreſented by 20) is 196 Parts of a Foot.

The firſt fourth Number—— 58.900
The ſecond fourth Number——196 added
The Sum is the Content ——59.096

Which is 59 Feet ¼ Inch.

Note, If the Timber be Wainy, that is neither Square nor Round, take one Wain in and leave the other out.

The ſame done by *Foot-meaſure*.

F. Par.
The Greater Diameter 22 Inches or —— 1.83
The Leſſer Diameter 18 Inches or—— 1.5
The Sum of both Diameters is ——Foot 2.33
Half is the middle Diameter————Foot 1.67
Difference of the Diameter is————Foot 0.13
Half Difference of the Diameter is Feet 0.17

Then ſet 1.13 on the Gert-line D, to the Length 27 Feet on the Double-line C; and then againſt 1.67 on the Gert line D, is 58 Feet $\frac{9}{10}$. Then,

Set 1.13 on the Gert line D, to 9 Feet, on the Double-line C; and then againſt 0.17 on the Gert line D, is .196 Parts of a Foot, and both put together is the Content; that is, 58.9 and .196 added makes 59.096, or 59 Feet ¼ Inch, as before.

Suppoſe the Solid be Square, and having the ſame Dimenſions; that is Length, 27 Feet, the greater End 22 Inches Square, and the leſſer End 18 Inches Square, what's the *Content*? F. Par.

			F. Par.
The greater Square	22	—Inches or—	1.83
The leſſer Square	18	—Inches or—	1.5
Sum of both Squares	40	—Inches or—	3.33
$\frac{1}{2}$ is the mid. Square	20	—Inches or—	1.67
Differ. of the Ends	4	—Inches or—	0.33
$\frac{1}{2}$ Differ. of the Ends	2	—Inches or—	0.167

Then to find the Content by the Inch-meaſure it's thus. Set 12 on the Gert-line D, to 27 Feet (the Length of the Solid) on the Double-line C; then againſt 20 Inches (the middle Square) on the Gert-line D, is 75 Feet $\frac{4}{10}$. Again ſet 12 on the Gert-line to 9 Feet (one third of the Length) on the Double-line; and againſt 2 Inches (the half Difference of the Ends) on the Gert-line, is $\frac{25}{100}$ parts of a Foot; both together is 75 $\frac{65}{100}$ parts (which is almoſt 8 Inches) the Content of the Solid: Or thus, by Foot-meaſure.

Set 1 on the Gert-line, to the Length 27 Feet on the Double-line, then againſt 1 Foot 67 Parts the (Middle Square) on the Gert-line, ſtands 75 Feet $\frac{4}{10}$, and ſetting 1 on the Gert-line, to 9 Feet (the one Third of the Length, on the Double-line; then againſt 0.167 (the half Difference of the Ends) on the Gert-line, is (on the Double-line) $\frac{25}{100}$ Parts of a Foot, and both together 75 Feet $\frac{4}{10}$ and $\frac{25}{100}$ is 75 feet $\frac{65}{100}$ par of a Foot as before, exactly agreeing both by *Inch-meaſure* and *Foot-meaſure* ; and here note the Numbers that are fix'd in this kind are thus to be underſtood : 13.54057, *&c.* in ſhort 13.54 is the Diameter of a Circle, whoſe Area or Content is 144 Square Inches : And 1.1283814. &c. in ſhort 1.13 is the Diameter of a Circle whoſe Area or Content is 1 Foot, or 1 any Thing.

PROB. IV.

To find how many Inches in Length will make a Foot Solid at any Gert, being the ſide of a Square, not exceeding 40 Inches.

LET the Gert or ſide of the Square upon the Gert-line be ſet to 1 on the Numbers, then againſt 41.57 of the Gert-line, is the Number of Inches on the Numbers that will make a Solid Foot.

Example.

Let the Side of a Square be 7 Inches, ſet 7 on the Gert-line D, to 1 on the Double-line C, then againſt 41.57 on the Gert-line D, is 35$\frac{1}{4}$ Inches on the Double-line C, for the Length of 1 Foot Solid.

To do the ſame in *Foot-meaſure* ; the ſide of the Square 7 Inches, in *Foot-meaſure* is .58 parts ; which ſaid 58 parts on the Gert-line D, being ſet to 1, on the Double-line C ;

then againſt 1 on the *Gert-line* D, is 2.94, that is 2 Feet 94 parts, or 2 Feet 11¼ Inches for the Length, to make one Foot of *Timber*.

PROB. V.

Having the Diameter of a Circle, or Round Piece of Timber; to find the Side of a Square within the Circle, or to know how many Inches the Side of the Square will be when the round Timber is ſquared.

The Rule.

Set always 8.5 on the *Double-line* A, to 6 on the *Double-line* B; then againſt the Diameter on the Line A, is the Side of the *Square* on the Line B.

Example.

Let the Diameter be 18 Inches; ſet 8.5 on A, to 6 on B; then againſt 18 on A, is 12½ on the *Line* B, for the Side of a Square within that Circle.

The ſame done in *Foot-Meaſure*, the *Diameter* being 18 Inches is in *Foot meaſure* 1.5; Then ſet 1 on the *Double-line* A, always to .707 or .71 almoſt, on the *Double-line* B; then againſt the Diameter 1.5 on the *Double-line* A, is 1.7 on the *Double-line* B; that is Foot 1.7 Tenths the Side of a Square within a Circle, whoſe Diameter is Foot 1.5 Tenths. And here note the given Numbers 8.5, and 6 (but more truely 1, and .707) are, one the Diameter of a Circle, the other the Side of a Square within that Circle.

PROB. VI.

By having the Gert of a Tree, or Round Piece of Timber, to find the Side of a Square within.

The Rule.

Set 10 to 9 on the Line A and B, then againſt the *Gert* on the Line A, is the Inches for the Side of the Square on the Line B.

Example.

Let the Gert be 16 Inches, Set 10 on the the Line A, to 9 on the Line B; then againſt 16 on the Line A is $14\frac{1}{4}$ on the Line B, for the Side of the Square.

By *Foot-Meaſure* it's thus; the Gert 16 Inches, is Foot 1.33 parts; then ſet 10 on the *Double line* A, to 9 on the *Double-line* B, and againſt the Gert, 1.33 on the *Doulle-line* A, is on the *Double-line* B, 1.19 that is 1 Foot 19 Parts, which is 1 Foot $2\frac{1}{4}$ Inches, for the ſide of the Square within,

And *Note*, The Numbers 10 and 9, or 1 and 9, ſhews when the Square within the Circle is 1, the fourth part of the Circumference $\frac{9}{10}$ parts of the ſame.

By theſe two laſt Problems you may know (before a piece of *Timber* is hewn) how many Boards or Planks of any Thickneſs it will make.

PROB. VII.

By the fourth part of the Gert of Round Timber, to find the ſide of a Square equal to it.

The Rule.

Set 1 on the Line A, to 1.128 on the Line B; then againſt the (one fourth of the whole) Gert on the Line A, is on the Line B, the Side of the Square equal to it?

Example. Let the Gert (that is the one fourth of the whole Gert) be 16 Inches: how much is the Side of the Square equal to it?

Set 1 to 1.128, but ſhorter to 1.13, on the Lines A and B; then againſt 16 on the Line A, is 18 on the Line B; which ſheweth that a Square whoſe ſide is 18 Inches, is equal to a Circle whoſe Gert is 64 Inches, or one fourth of its Gert is 16 Inches.

By *Foot-Meaſure*, the *Rule* being ſet as before, 1 againſt 1.13; then againſt Foot 1.33 parts (equal to 16 Inches) you will find 1.5, that is 1 Foot $\frac{5}{10}$, equal to 1 Foot 6 Inches, the Side of a Square equal to the given Gert, the ſame as before.

CHAP. X.

To meaſure Brick-Work.

BRick-*Work* is meaſured by the *Rod* of 16 Feet and a half, whoſe Square is 272¼ which ſheweth that the Point on the *Double-line* is 272¼, but 272 being marked on the *Rule* will ſerve (without any conſiderable Error) a Brick and a half thick, and is the Fix'd Number.

An Example.

There is a *Brick-wall* whoſe Length is 564 Feet, the Height is 10 Feet and ½: Set 272 the *Double-line* A, to 564 on the Line B; then againſt 10½ on the Line A, is $21\frac{7}{10}$ *Rod*, the Content on the *Double-line* B.

Note 1. Always the Fix'd Number that goeth with the Queſtion is called the firſt *Number*, which you may ſet to either of the other Numbers.

Note 2. That 272¼ Feet makes a *Rod* of *Brick-work*, at a *Brick* and a half Thickneſs: if it be thicker fewer Feet go to a *Rod*; if thinner the more.

If you demand how many Feet make a *Rod* at two *Bricks* Thickneſs: Two being the firſt or fix'd Number that goeth with the Queſtion muſt be ſet to 1½; then againſt 272¼, is about 204, *viz.* 204 Feet $\frac{19}{100}$, and ſo for any other Thickneſs, for which

Take

Take this General Rule,

Set 1½ to any Thickneſs; then againſt 272¼ on the ſecond *Length* is the *Number* of *Feet* that makes a *Rod* to that Thickneſs, and is called the Firſt Number for that Thickneſs, as in the *Table* following.

By this Table, made by the ſame *Rule*, by the *half Brick*'s Thickneſs of the Wall, you have the firſt *Number* by Inſpection: as thus, againſt 2 *Bricks* ½ or 5 half *Bricks* thick, is 163 *Feet*, for a Sqnare *Rod*, and ſo for any other.

Half Bricks thick.	Square Feet in a Rod on the Superfices.	Half Bricks thick.	Square Feet in a Rod on the Superficies.
½. 1	817 Feet	½. 7	117 Feet
1. 2	408 Feet	4. 8	102 Feet
½ 3	272 Feet	½. 9	91 Feet
2. 4	204 Feet	5 10	82 Feet
½. 5	163 Feet	½. 11	74 Feet
3. 6	136 Feet	6. 12	68 Feet

CHAP. XI.

Meaſuring of LAND.

LAND is uſually meaſured by the *Pole*, *Perch* or *Rod*, which is 16½ *Feet* long; 40 *Poles* in Length and 4 in Breadth makes an *Acre*, ſo that an *Acre* of *Land* contains 160 *ſquare Poles*, half an *Acre* is 80, and a quarter is 40.

Some uſe a *Pole-Chain*, and others a 4 *Pole-Chain*, the beſt for Uſe is that of 4 *Poles*. This *Chain* is called *GUNTER*'s *Chain*. It is divided into 100 Links or Parts, every Link is 7 Inches and 92 Parts of an Inch in Length.

P R O B. I. *By the Pole Chain*, There is a Plot of Ground 35 Pole or Perch broad, and 185 Pole long, how many Acres is the Content?

By the Sliding Rule.

Thus, Set 160 to the Breadth, then againſt the Length is the Content.

Example.

Set 160 on the *Double-line* A, to 35 the Breadth on the *Double-line* B; then againſt 185, the Length on the Line A, is $40\frac{46}{100}$ (that is 40 Acres and almoſt $\frac{1}{2}$) on the *Double-line* B; the Content.

Arithmetically.

The Rule. Multiply the Length in Poles by the Breadth in Poles, and divide the Product by 160 (the Poles in an Acre) the Quotient is the Acres, if any remains, divide again,

$$\text{By}\left\{\begin{array}{c}120\\ 80\\ 40\end{array}\right\}\text{the Quotient is}\left\{\begin{array}{c}\frac{3}{4}\\ \frac{1}{2}\\ \frac{1}{4}\end{array}\right\}\text{of an Acre.}$$

Example.

The Length ——————————— 185 *Poles*
The Breadth ——————————— 35 *Poles*

```
         925
         555
 16|0)647|5(40 Acr
      64
   ————————
  4|0)007|5(1 quar
         4
   ————————
        35 Poles
    (remaining
```

But 75 *Poles* remaining after the firſt Diviſion, *viz.* by 160, which 75 being divided by 40 the laſt Remainder is 35, which makes the *Content* 40 *Acres* one *Quarter* and 35 *Poles*, or almoſt 40 *Acres* and ½.

More Examples by the Rule.

Breadth	Pole.	Length	Pole.	*Content.*
42		49		12 Acres $\frac{88}{100}$ or 12¾.
53		64		21 Acres [illegible] or 21¼.
64		85		34 Acres juſt.

P R O B. II:

By the four Pole Chain. There is a Plot of Ground containing 16 Chains 25 Links in Breadth, and 57 Chains 30 Links in Length, what is the Content of that piece of Land?

By the ſliding Rule.

The Rule. Set 10 on the *Double-line*, to the Breadth in *Chains* and *Links* on the other, then againſt the Length in *Chains* and *Links* is the *Content?*

Ex-

Example.

Set 10 on the Double-line A, to 1625 on the Double-line B, then againſt 57.30 on the Double-line A, is 93 Acres and ſomething more, for the Content on the Double-line B,

Arithmetically.

```
Length———Chains 57.30 Links.
Breadth———Chains 16.25 Links
                 ————————
                  28650
                 11460
                34380
                5730
              ——————————
Acres 93|11250 cut off five Figures
                   4
               ——————
no Roods ——|45000
               40
             ——————
Poles———18|00000
```

Note, 4 *Roods* make an *Acre*, and 40 *Poles*, *Perches* or *Rods* makes one *Rood* or *Quarter* of an *Acre*.

More Examples by the Rule.

Breadth	*Length*	
3,35	15,32	5 *Acr.* a little more
4,53	16,42	7½ *Acres* almoſt
16,28	72,51	118 *Acres*

Note, *Gunter*'s *Chain* containeth four *Statute Poles* in 100 *Links*, ſo that any Number of *Chains* is no more than ſo many 100 *Links*; as 4 *Chains*, is 400 *Links*, 6 *Chains* is 600

Links, *&c.* and 160 Square Statute Poles is an Acre, each Pole being 16 Feet and a half. Therefore in a ſquare Chain is 16 ſquare Poles. If you divide 160 (the ſquare Poles in an Acre) by 16 (the ſquare Poles in a Chain) the Quotient is 10, to the ſquare Chains in an Acre.

A Square Chain contains 10000 Square Links (for it is 100 multiplied by 100) and conſequently an Acre is 100000 Square Links.

Therefore the Reaſon of the foregoing Operation is evident, for if you multiply 5730 Links by 1625 Links, the Product will be 9311250 Square Links. Divide 9311250 by 100000 (the Square Links in an Acre) the Quotient is Acres, and the Remainder is Parts of an Acre. But to divide by 100000 is no more than to cut off five Figures to the Right-hand, ſo will the remaining Figures to the Left hand be Acres, and thoſe cut off to the Right-hand 11250, are parts of an Acre: Again multiply thoſe five Figures cut off from the Right-hand of the Product, by 4, and from the Prodnct cut off five Figures to the Right-hand, thoſe on the Left hand will be Roods, and if thoſe cut off be multiplied by 40, and from the Product five Figures be cut off from the Right-hand, thoſe on the Left-hand, are Poles or Perches.

So in the preceding Operation there is 93 Acres, no Roods 18 Perches for the Content.

PROB. III.

How to reduce Statute-Meaſure to Cuſtomary, and the contrary.

According to a *Statute* made in the 33*d* of *Edward* the I. and likewiſe in the 25th of *Elizabeth*, a Statute Pole is 16 Feet and a half long. Now divers parts of *England* uſes a Pole of 18 Feet long, and ſome a Pole of 21 Feet long, and others a Pole of 24 Feet long. Therefore to turn one ſort of Meaſure into another; ſuppoſe *Statute* into *Cuſtomary*, do thus; multiply any Number of Acres, Roods and Perches *Statute-Meaſure*, by the Square half Yards, or Square half Feet, in a Square Pole of *Statute-Meaſure*, the Product divide by the Square half Yards, or ſquare half *Feet* in a Pole of the *Cuſtomary-meaſure*, the Quotient gives you the Acres, Roods and Perches of that *Cuſtomary-meaſure*; as for *Example*. In 172 Acres *Statute-meaſure*, how many Acres of 18 Feet to the Pole or Perch?

In a *Statute* Pole or Perch, there is five *Yards* and a half, that is 11 half *Yards*; conſequently in a ſquare *Statute* Pole there is 121 ſquare half *Yards*, and in a ſquare Pole of 18 Feet, there is 144 ſquare half *Yards*,

172 Acres Statute Meaſure.
121 Square half Yds. in a Statute Pole
172
344
172
144)20812(144 Acres Cuſtomary and $\frac{76}{144}$.
144
0641
576
0652
576
076 Overplus.

Therefore the Cuſtomary Acres (at 18 Feet to a Perch) is 144 $\frac{76}{144}$ of an Acre, the Overplus multiply by 4, and the Product divide by 144 gives Roods; again, multiply the Remainder by 40, and the Product divide by 144, the Quotient will be Perches; as by the following Operation of the preceeding Remainder.

76 Overplus, or Remainder.
4
144)304(2 Roods
288
016
40
144)640(4 Perches.
576
064

So that 172 Acres Statute Meaſure is 144 Acres, 2 Roods and 4 Perches, with a ſmall Remainder (not worth taking notice) of *Cuſtomary Meaſure*, of 18 Feet to the Pole or Perch.

If there had been any given Roods and Perches with the Acres, then you muſt turn all into Perches, and having multiplied and divided as before directed, divide the Quotient by 160, or 40, and that Quotient again by 4.

PROB. IV.

In 543 *Cuſtomary Acres, at* 18 *Foot to the Perch, how many Acres of* Statute-Meaſure?

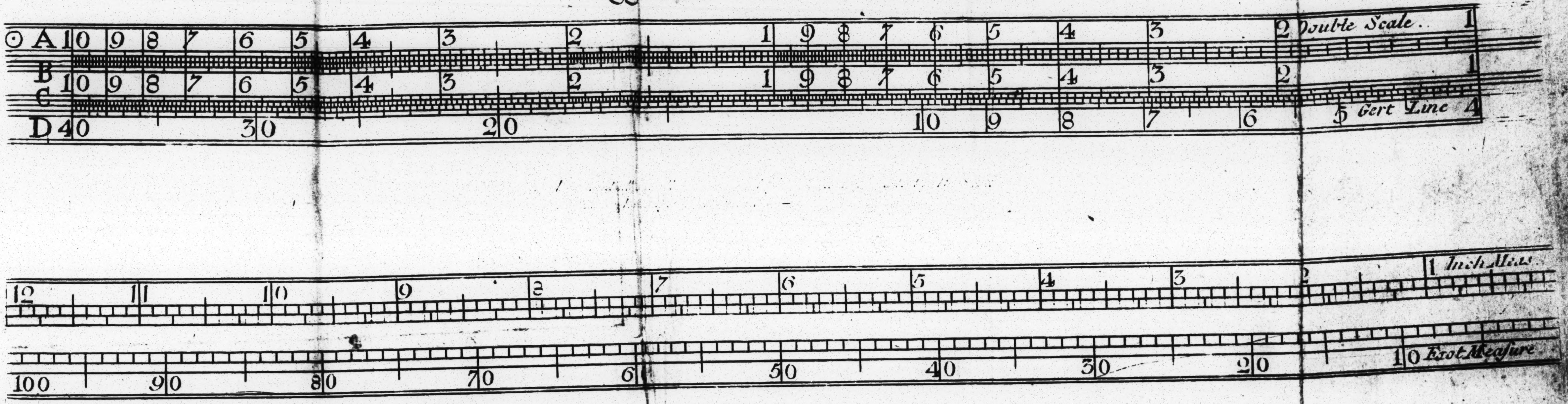
543 Cuſtomary Acres.
144 ſquare ½ Yards in a cuſtomary *Acre*,
2172
2172
543
121)78192(640 Statute *Acres*
726
0559
484
0752
726
26 Remainder multiplied
by 4
104 no Roods
40
121)4160(34 Perches
363
0530
484
046 Remains

Here you ſee that in 543 Cuſtomary A[illegible] at 18 Feet the Perch there are 646 A[illegible]es, no Roods, 34 Perches Statute-Meaſure and $\frac{46}{121}$.

Cuſtomary Acres as well as Statute Acres, contain 160 Square Perches, the bigneſs is only in the bigneſs of the Perch.

FINIS.

Coggeſhall's Rule for Menſuration


⊙ A 1 0 9 8 7 6 5 4 3 2 1 9 8 7 6 5 4 3 2 Double Scale. 1
B 1 0 9 8 7 6 5 4 3 2 1 9 8 7 6 5 4 3 2 1
C
D 4 0 3 0 2 0 1 0 9 8 7 6 5 Gert Line 4
12 11 10 9 8 7 6 5 4 3 2 1 Inch Meas.
100 90 80 70 60 50 40 30 20 10 Foot Meaſure

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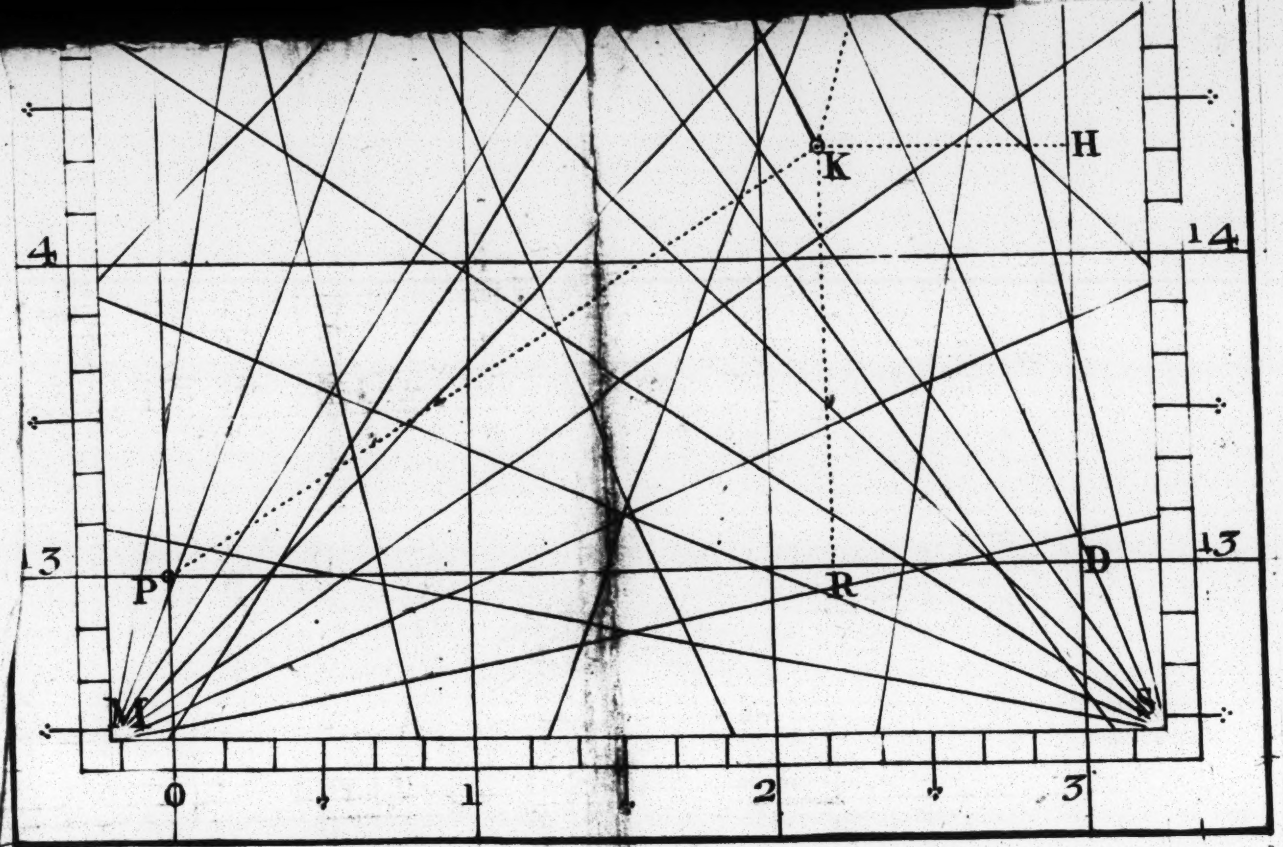

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